The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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U.S. PATENT AND TRADEMARK OFFICE BOARD OF PATENT APPEALS AND INTERFERENCES

*Ex parte* YONG YAN

Appeal No. 2006-0359
Application 09/922,142[1]

ON BRIEF

Before HAIRSTON, KRASS, and BARRETT, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

## DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1-28.

We reverse.

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[1] Application for patent filed August 3, 2001, entitled "Automated Mask Selection in Object-Based Video Encoding."

## BACKGROUND

The invention relates to a video object encoding system and method that dynamically selects a mask type based on the characteristics of the video object.

Claim 1 is reproduced below.

1. A video object encoding system, comprising:

an object evaluation system that evaluates a video object using a predetermined criterion; and

a mask generation system that generates one of a plurality of mask types for the video object based on the evaluation of the video object.

## THE REFERENCES

The examiner relies on the following references:

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| Chen et al. (Chen) | 6,208,693 | March 27, 2001 |
| Sekiguchi et al. (Sekiguchi) | 6,611,628 | August 26, 2003 (filed November 17, 2000) |

## THE REJECTIONS

Claims 1-5, 7-15, 17-24, and 26-28 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Chen.

Claims 6, 16, and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen and Sekiguchi.

We refer to the final rejection (pages referred to as "FR__") and the examiner's answer for a statement of the Examiner's rejection, and to the brief (pages referred to as "Br__") and reply brief (pages referred to as "RBr__") for a statement of appellant's arguments thereagainst.

DISCUSSION

Appellant argues that Chen teaches a system for generating the shape mask as the object shape within a bounding box that isolates the object from the other objects in the image and fails to teach "a mask generation system that generates one of a plurality of mask types for the video object based on the evaluation of the video object." "Hence, rather than evaluating the object to determine the type of mask, Chen teaches using a bounding box and generating the object shape within the isolating box based on evaluating the object. Nowhere does Chen disclose generating 'one of a plurality of mask types based on the evaluation of the object' as is recited in claim 1." (Br7.) It is argued that independent claims 11 and 20 recite subject matter similar to claim 1 and are patentably distinguishable over Chen (Br7-8). We look to see where the examiner addresses generating one of a plurality of mask types based on an evaluation.

The examiner responds (EA10):

> In col. 6, ln. 47-52, Chen discloses the generation of a shape mask that can be a binary map or a gray scale map for generating the pixel mask for the video object based on the evaluation process in Chen's fig. 5. In fig. 5, Chen discloses the steps 510 and 515 discloses that the segmentation of the video object of an image is the evaluation of the video object because when the video object is segmented, the video object is evaluated for identification so that one of a plurality of mask types (ie. bounding box with identified macroblocks) can be generated for the video object based on the video object evaluation or segmentation.

Appellant replies that "[t]he reference section in Chen ... discloses a coding method wherein the <u>content</u> of the shape mask generated maybe [sic] one that indicates a pixel is part of or not part of an object or some form of gray scale mapping of the pixels in an object, and the <u>content</u> identifies the shape of the object" (RBr4-5), but this is not the same as "one of a plurality of mask types for the video object based on the evaluation of the video object." "Rather, the <u>contents</u> of the shape mask represent the shape of an object and does not represent a mask type that is determined based on an evaluation of the object." (RBr5.) It is argued that Chen only teaches a bounding box mask type, which is not determined "based on the evaluation of the object" (RBr5). It is argued that "[t]he segmentation of the image cannot be said to be an evaluation of the object as the segmentation merely describes a process for dividing the image into sections (the sections containing one or more objects" (RBr6).

In determining whether Chen "generates one of a plurality of mask types for the video object based on the evaluation of the video object," we first examine what is meant by a "mask type." It is disclosed (spec. at 2, lines 3-12):

> In order to capture video objects in the alpha plane for encoding, shape masks are used that match or approximate the shape of the object. Commonly used masks in the alpha plane for object-based encoding include: (1) an arbitrary shape that closely matches the object on a pixel level (i.e., a pixel-based mask); (2) a bounding box that bounds the object shape (e.g., a rectangle); or (3) a macroblock-based mask. Depending on the shape and complexity of the

> object, bit rate requirements for implementing each mask type may vary. Moreover, while one type of mask may require fewer bits for shape coding, the same mask type may result in a higher number of bits required for texture coding.
>
> Accordingly, a need exists for a system that can automatically select the best mask in order [to] maximize bit rate savings.

Thus, it is admitted that different mask types were known, but that the mask type was not automatically selected. Three mask types are noted to be common and the flowchart in appellant's Fig. 2 and pages 5-6 of the specification describe the method of evaluating a video object and selecting a mask type. A "mask" can be broadly defined as the information that defines the shape of an object or pixels associated with an object. More specifically, the shape information or object mask is used to indicate the arbitrary shape of an image or video object and the region in which the texture of this object needs to be coded.

Chen discloses that MPEG-4 provides explicit shape coding because the shape information is coded separately from the texture information (luminance and chrominance values for each pixel) (col. 2, lines 9-12). Chen discloses an improved implicit shape coding technique the shape of each object can be ascertained based on the texture information (col. 2, lines 20-41). Prior to calculating a bounding box, the object is first segmented from the video frame using any well-known segmentation technique (col. 7, lines 3-7). Segmentation refers to identifying constituent parts or objects in an image, e.g., by

detection of discontinuities between an object and the background, edge or boundary detection, thresholding, and other autonomous techniques. See, e.g., Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing (Addison-Wesley Publ. Co. 1992), Chapter 7. Once the outline of the object is determined by segmentation, a bounding box is chosen such that it contains a minimum number of 16 pixel x 16 pixel macroblocks (Fig. 3; col. 7, lines 7-9). The macroblocks are either: (1) outside the object; (2) inside the object; or (3) on the object boundary (col 7, lines 12-40). Encoding is done on a macroblock by macroblock basis. For macroblocks on the boundary, pixels outside the object (e.g., background pixels) are replaced with a chroma-key color and the macroblocks are coded, which implicitly codes shape information (col. 8, lines 12); macroblocks outside the object and within the bounding box are not coded (col. 8, lines 12-13); blocks inside the object are coded (col. 8, lines 14-17). When the coded signal is reconstructed, a color extractor and shape mask generator 249 can determine which pixels are located within the object and which pixels are located outside of the object and thereby identify the original shape of the object in the video object plane (VOP) (col. 6, lines 32-44). The pixels located within the object are reconstructed (col. 6, lines 44-47). The color extractor and shape mask generator 249 also generates and outputs a shape mask which can be a binary map

(a 1 or 0 for each pixel) or gray scale map identifying whether each pixel is inside or outside the video object and the shape mask can be used to combine multiple video images (col. 6, lines 47-55). Gray scale defines the transparency of an object, which is not necessarily uniform; it can vary over the object, so that, e.g., edges are more transparent (a technique sometimes called feathering). Both binary maps and gray scale maps are forms of "pixel masks."

Although Chen contains many of the words used in appellant's disclosure, such as "shape mask," "bounding box," "macroblocks," and binary map mask corresponding to a "pixel-based map," we find that it does not teach a "video object encoding system" having "a mask generation system that generates one of a plurality of mask types for the video object based on the evaluation of the video object." Chen does not use explicit shape coding. Instead Chen uses implicit shape coding where the shape can be ascertained from the texture coding. Nevertheless, since a "mask" defines the shape of an object or pixels associated with an object and the texture coding implicitly defines the shape of the object by the pixels, we find that Chen can be considered to use a "pixel mask," where both binary maps and gray scale maps are forms of "pixel masks." Chen does not evaluate the video object to determine a mask type and generate any other mask types based on the evaluation. The bounding block and the macroblocks

are not masks that define the shape of the object for encoding, but are only used as part of the process to determine which pixels are part of the object and which are part of the background; i.e., there is no encoding of the whole bounding box or all of the macroblocks that define the object. The examiner's finding that the bounding box with identified macroblocks correspond to the plurality of mask types (EA10) is in error. Therefore, we find that Chen does not anticipate claim 1 or its dependent claims 2-5 and 7-10. Independent claims 11 and 20 contain similar limitations to claim 1 and the anticipation of claims 11 and 20 and their dependent claims 12-15, 17-19, 21-24, and 26-28 must also be reversed.

Sekiguchi is applied with Chen to the obviousness rejection of claims 6, 16, and 25. However, Sekiguchi has not been applied to overcome the deficiencies with respect to the rejection of the independent claims. Accordingly, the rejection of claims 6, 16, and 25 is reversed.

## CONCLUSION

The rejections of claims 1-28 are reversed.

REVERSED

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| KENNETH W. HAIRSTON<br>Administrative Patent Judge | ) | |
| ERROL A. KRASS<br>Administrative Patent Judge | ) | BOARD OF PATENT APPEALS AND INTERFERENCES |
| LEE E. BARRETT<br>Administrative Patent Judge | ) | |

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